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ARDC Director's Comments

From Crops to Fiber Optics - What We're Up To!

by Daniel J Duncan, ARDC Director & IANR Ag Research Division Assistant Dean and Director

The weather is getting cooler, leaves are starting to turn, students are back in class and harvest is wrapping up earlier than usual this year. Yields appear to be excellent again this year. Soybean yields have been especially impressive. 2005 was another tremendous growing season that culminates in volumes of research data to be analyzed in the coming months. I want to take this opportunity to thank everyone at the ARDC for their hard work and dedication during the past growing season.

Fall is also the time of year our feedlot people start to get really busy. Feeder cattle are starting to pour into the ARDC making life more hectic for them in the coming months. This season will be especially eventful as they will be utilizing part of the new feedlot for the first time.

At the invitation of Chancellor Perlman, the ARDC was featured at the Chancellor's pre-game luncheon prior to the Texas Tech game. We produced a short video about the ARDC for this event and used the opportunity to produce a longer version at the same time. I want to thank everyone who

participated in the making of the video-especially Deloris Pittman for her work on pulling this all together.

We have two large projects in the development stage at the ARDC. One will install over 11 miles of fiber optic line that will link all major buildings on the ARDC to the Christenson Research and Education Building. This project is made possible through funding made available through the Vice Chancellor's office and through the generosity of August Christenson. The other project involves construction of a new shop and office building for the Farm and Facilities staff. Construction is slated to start on this project around the first of the year.

Finally, we would like to welcome Dr. Gary Cunningham to Nebraska. Dr. Cunningham will become the Dean of the Agricultural Research Division on December 15, 2005. We look forward to his leadership in the coming years. □

Back by Popular Demand...

Sue Martin to Provide Marketing Advice at Dec. 9 Soy Expo



This year's Nebraska Soybean Day & Machinery Expo features an encore keynote speaker...Sue Martin. Martin is president and owner of Ag & Investment Services, Inc. and is a regular analyst on the nationally broadcast television program "Market to Market" which is syndicated in 40 states. Come learn from Martin's insight in marketing strategies, future trends on the domestic and global level, and formulation of marketing plans.

SOY EXPO - Cont. on P. 2

Learn more about the Expo on Page 2!

Levis Receives National Recognition

Don Levis, UNL Extension Educator, was recognized by the *National Hog Farmer* magazine in their "Who's Who in the U.S. Pork Industry" list. This is a very high honor, as only fifty people nationwide were selected.

In an effort to recognize some of the people who have been instrumental in shaping the U.S. pork industry over the last 50 years, the *National Hog Farmer* magazine put out a call for nominations. Over 200 men and women were nominated in 15 categories. The nominations were reviewed by nine past and current *National Hog Farmer* editors on the basis of strong leadership, commitment and vision.



Don Levis, UNL Extension Educator recently helped educate youth on the importance of swine production and byproducts during the Ag Awareness Festival.

The magazine noted, "Don Levis' track record as an extension swine specialist at the University of Nebraska and director of the Ohio Pork Industry Center spans several decades. Levis has consulted with an estimated 1,136 swine enterprises in the United States and worked in 11 foreign countries, providing essential information, training and troubleshooting swine reproductive problems."

The magazine also stated, "Levis has spoken at more than 600 pork producer meetings, and published more than 140 Extension-type publications on swine breeding facility design, artificial insemination and reproductive management. And, he has developed numerous computer software programs dealing with breeding and housing. He has received more than a dozen service awards including those sponsored by the University of Nebraska-Lincoln Extension, the U.S. Department of Agriculture and the Nebraska Pork Producers Association."

We commend Don on this national recognition and top honor. □

ARDC Feature Unit CALMIT

The Center for Advanced Land Management Information Technologies (CALMIT) was founded to significantly enhance and expand research and instructional activities in remote sensing, geographic information systems (GIS), automated cartography and image processing.

CALMIT is jointly administered by the UNL Conservation and Survey Division and UNL's School of Natural Resources. And the center's faculty regularly collaborate with various UNL departments and research centers, UNL's Institute of Agriculture and Natural Resources, University of Nebraska at Omaha, Creighton University, and the University of Kansas.

While the primary location for CALMIT is at the University of Nebraska in Lincoln, CALMIT also maintains a field research facility at the Agricultural Research and Development Center. The following article provides details on one of the projects that the

FEATURE UNIT - CALMIT Cont. on P. 2

FEATURE UNIT-CALMIT - Cont. from P. 1

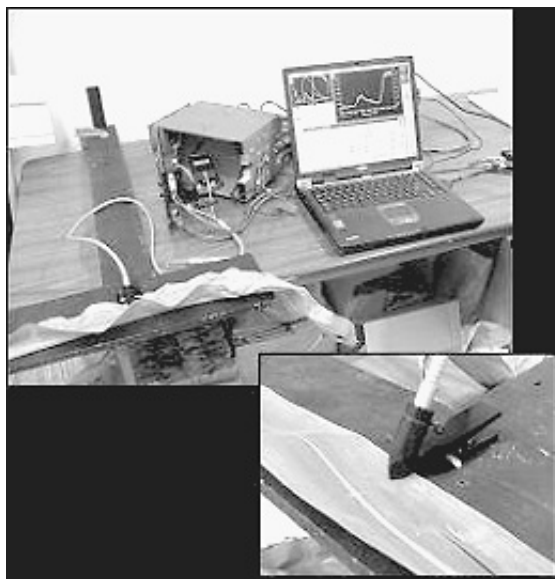
Center for Advanced Land Management Information Technologies is involved with at the ARDC.

Remote Quantification of Crop Health

The estimation of the size of the photosynthetic 'factory' of a crop canopy and its functioning to monitor the physiological status of crops and to detect physiological stresses is a major interest for agronomic studies. Specifically, canopy photosynthesis constitutes the basic process of transforming solar energy to perform crop's physiological functions (i.e. plant growth, water uptake, nutrient uptake, respiration, etc.). At the same time, the photosynthetic process is ultimately underpinned by the amount of chlorophyll (Chl) pigments contained in a canopy that in turn respond to short and medium time-scale environmental stresses (e.g. nutrient and water stress). **Canopy chlorophyll content per unit area** is a quantitative measure of the size and the functionality of the photosynthetic components since it integrates the amount of green leaf area *with* its level of greenness.

A research study was conducted to quantify **crop health** through a precise estimation of total chlorophyll per area. For this purpose, non-destructive and remote sensing techniques were used to quantitatively estimate the physiological status of maize crops based on total chlorophyll canopy content.

The study was carried out during 2004 and 2005, taking advantage of the experimental fields that belong to the Carbon Sequestration Program at the University of Nebraska-Lincoln Agricultural Research and Development Center, funded by the U.S. Department of Energy EPSCoR program. Maize plants from irrigated and rainfed fields were weekly sampled. The light reflected from each leaf of each plant sampled were measured using a hyperspectral radiometer (Ocean Optics, USB 2000) with a leaf clip accessory attached to the fiber optic (Figure 1). The median of the reflectance obtained from each leaf is used to estimate its Chl content using the spectral vegetation index (SVI) developed by Gitelson et al. (2003), defined as: $SVI = (R - R_{red\ edge} - R_{NIR}) / R_{NIR}$.



Hyperspectral sensor system with leaf clip accessory. The sensor is connected to a computer. (Figure 1)



Leaf area meter (Licor 3100A). (Figure 2)

The total and green area of each leaf was measured with a leaf area meter (Licor 3100A) (Figure 2). The estimated Chl content per leaf was multiplied by its correspondent green leaf area to obtain the total Chl content of that leaf. The sum of the total leaf Chl content times the GLAI gives the total Chl content in the canopy per ground area. The position of each leaf along the stem of the plant (i.e. distance from the bottom of the plant) was registered in order to obtain the vertical distribution of the chlorophyll content within the canopy.

At the same time, canopy spectral measurements were taken two times a week during the entire growing season over six spots on the maize fields. A dual-fiber system, with two inter-calibrated Ocean Optics USB2000 radiometers, mounted on "Goliath", an all-terrain sensor platform [Rundquist et al., 2004]



Canopy hyperspectral reflectance is measured using a sensor system mounted on "Goliath", an all terrain sensor platform. (Figure 3)

SOY EXPO - Cont. from P. 1

The expo runs from 8:30 a.m.-2:30 p.m. in the heated pavilion at the Saunders County Fairgrounds in Wahoo. Presenters include university researchers and specialists, Nebraska Soybean Board representatives, soybean growers and private industry representatives.

The Expo kicks off with coffee, doughnuts and the opportunity to view equipment and exhibitor booths. Speakers start at 9 a.m. Jim Erwin, Regional Agronomist with NK Brand Seeds, will discuss the 2005 growing season, what we saw and what it means for 2006. Alex Martin, UNL Extension Weed Specialist, will discuss controlling early season weeds in soybeans. Martin will also look at "life after Roundup".

Producers will be able to visit with representatives from seed, herbicide, fertilizer and equipment companies and view new farm equipment during a 30-minute break at 10 a.m.

Weather - past - present & forecast for 2006 will be covered by Allen Dutcher, UNL Climatologist. He will also discuss if there is anything behind the talk of global warming. Charles Wortmann, UNL Extension Soil Scientist, will discuss managing lime and phosphorus in soybean production.

Greg Anderson, a soybean grower from Newman Grove, will review eighteen years of growing continuous soybeans on the same farm and if it is working. The morning program concludes with the Nebraska Soybean Checkoff update and association

information by Nebraska Soybean Board and Nebraska Soybean Association representatives.

The always entertaining "Pancake Man" will not only satisfy hungry appetites at lunch time, but will amuse expo attendees with his pancake flapjack tossing talents.

Sue Martin headlines the afternoon program. Those attending will learn from Martin's grain market report card & outlook for corn & soybean futures for the next six months.

Martin has 30 years experience in the brokerage business. She has also served as secretary-treasurer of the National Introducing Brokers Association and also served on the National Futures Association Nominating Committee.

Martin offers daily commentary and market analysis for radio station KFRM which covers Kansas, Oklahoma, and parts of Nebraska, Texas, Colorado, New Mexico, Arkansas and Missouri.

The goal of the Soy Expo is to assist soybean growers in obtaining the latest information to enhance their profits, yields and practices

Registration is available the day of the expo at the door. For more information on the program or how to become an exhibitor, call (800) 529-8030 or e-mail kglewen1@unl.edu.

This free program is sponsored by University of Nebraska-Lincoln Extension in UNL's Institute of Agriculture and Natural Resources, the Nebraska Soybean Board, Saunders County Soybean Growers Organization and private industry. □



Duck Creek Watershed Workshop Focuses on Fewer Inputs and Increased Income

Local producers in the Duck Creek watershed area gathered at the Glenn Chvatal farm to learn about long-term continuous no-till production. Because most of the Sand and Duck Creek watershed is in agricultural production, conservation practices will play an important role in protecting not only the watershed area, but also Lake Wanahoo.

University of Nebraska-Lincoln Extension Engineer Paul Jasa and UNL Extension Educator, Keith Glewen presented the educational program. They taught producers how soil is saved, how soil quality improves and how to begin a continuous no-till program. They also demonstrated how to adjust planters, drills & combines to make no-till work. And discussion was held on how to manage weeds and other pests.

The program was a cooperative effort by UNL Extension, Nebraska Department of Environmental Quality (NDEQ), Lower Platte North NRD, and the USDA Natural Resources Conservation Service. The overall goal of this joint project is to increase landowner adoption of conservation and other best management practices in watershed areas affected by Lake Wanahoo. □



Paul Jasa and Keith Glewen of UNL Extension discussed the merits of long-term continuous no-till production.



Producers learned how to adjust their equipment to make no-till work in their operations.

About the People

Donald Rundquist is a professor with the School of Natural Resources and Conservation and Survey Division and Director of the Center for Advanced Land Management Information Technologies (CALMIT).



Donald Rundquist, PhD

He has been involved in research and teaching of remote sensing at the university level since the early 1970s. His special interests are in high resolution (spatial and spectral) remote sensing of surface waters and vegetation, field procedures and technologies and remote sensing as it relates to agriculture.

Recent research involves airborne remote sensing (using CALMIT's state-of-the-art "AISA" hyperspectral imager) of cropland agriculture and surface waters; close-range sensing of cropland vegetation and surface waters; and remote sensing (via aircraft and satellite) as well as close-range sensing of coral-reef and sea-grass communities.

Through this research, Rundquist hopes to improve the utility of remote sensing in monitoring crops, lakes and ponds, and coastal systems. He would like to see even further implementation of remote sensing as a practical tool.

Rundquist has a bachelor's degree in geography from the University of Wisconsin in Whitewater, a master's degree in geography from the University of Nebraska at Omaha and a Ph.D. in geography from the University of Nebraska-Lincoln. □



Preliminary results

The temporal distribution of total chlorophyll in the canopy during the growing season (Figure 4) is a useful and precise way to determine the vitality of vegetation and to detect vegetation stress from remotely sensed data.

Final comments

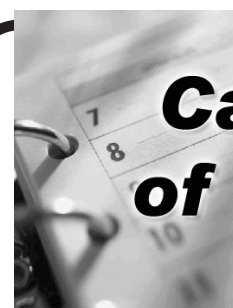
Up till now, the lack of practical and fast methodologies has prevented the use of the canopy chlorophyll content per unit area due to the difficulty on its quantification. Remote sensing techniques provide synoptic information from which it is possible to estimate chlorophyll content and forecast yield for an entire field.

This research will contribute to the plant physiology scientific community since it will provide a fast and objective way to quantify the physiological status of maize canopies through the estimation of its chlorophyll content. This will be a key tool to monitor crop status as well as to detect crop responses to short and medium scale time environmental stresses. □ -- CALMIT research article provided by Verónica S. Ciganda, MSc., PhD candidate-CALMIT.

If you are a **HIGH SCHOOL SENIOR** and have not been contacted about **RED LETTER DAYS** (a special open house day just for you!) - please visit <http://www.admissions.unl.edu>.

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You won't want to miss this special opportunity!



Calendar of Events

NOVEMBER

- 11 IANR Business Center Council Retreat 8:00-5:00
- 15 Saunders County Extension Board Meeting 7:00-10:00pm
- 18 NSFGPP Farm Management Day 9:00-1:00
- 19 Woody Floral Workshop 8:00-5:00

DECEMBER

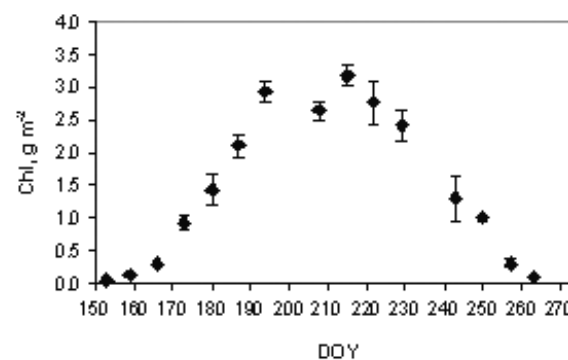
- 9 NE Soybean Day and Machinery Expo 8:30 -2:30 (Saunders Co. Fairgrounds, Wahoo)

JANUARY

- 6 Ag Programs Advisory Committee 10:00-2:00
- 18 Private Pesticide Applicator Training 1:00-4:00
- 18 Private Pesticide Applicator Training 6:30pm-9:30pm
- 19 Private Pesticide Applicator Training 9:00-12:00
- 21 Private Pesticide Applicator Training 9:00-12:00

FEATURE UNIT-CALMIT - Cont. from P. 2

(Figure 3), was used to collect data in the range 400-900 nm with a spectral resolution of about 1.5 nm. One of the radiometers, equipped with a 250 field-of-view optical fiber, was pointing downward to measure the upwelling radiance from the crop canopy. The other radiometer, was pointing upward to simultaneously measure incident irradiance. Intercalibration of the radiometers will be accomplished by measuring the upwelling radiance of a white Spectralon reflectance standard (Labsphere, Inc., North Sutton, NH), simultaneously with incident irradiance. These measurements are used to calculate percent reflectance.



Temporal distribution of canopy chlorophyll content. (Figure 4)

The Center for Advanced Land Management Information Technologies is on the cutting edge of research technologies.

Learn more at:
www.CALMIT.unl.edu

Holstein Provides Nutrition Education To Those With Limited Resources

Stretching the food dollar while keeping nutrition in mind can be difficult, especially for families with limited resources. That's where the Nutrition Education Program can step in and help.

The Nutrition Education Program (NEP) is a free program that teaches families on a limited budget. NEP helps participants acquire the knowledge, skills, attitudes, and behavior changes necessary to improve their health. Both programs are free to all participants who meet income guidelines. NEP participants are taught how to: budget their food dollars, save time and money by planning meals, stay healthy by making wise food choices, keep food safe to eat, feed their children, prepare healthy snacks, and learn about the importance of physical activity.

NEP participants graduate from a specified curriculum that is delivered by nutrition staff within the community. Participants in NEP are taught individually, in small groups, agencies, community sites, at home through mail lessons or phone visits.

Casey Holstein is the UNL Extension Assistant and Registered Dietitian working with the Nutrition Education Program in Dodge, Saunders, and Washington Counties. A Colorado native, she attended Colorado State University where she majored in Nutrition and Food Science and within that major - concentrated in Dietetics and Fitness. She then did an internship at Iowa State University.

Holstein says that in order to participate in the Nutrition Education Program, specific income guidelines must be met. Those who are currently receiving food stamps or who qualify for food stamps are eligible to participate in the NEP.

She teaches both classes and individual lessons for the NEP that are free to all participants who qualify. During the program a series of topics are covered, such as the new My Pyramid, healthy snacking, the importance of eating breakfast, each of the food groups, food safety and budgeting/meal planning and shopping. At the end of the six topic series each participant graduates and receives a certificate and a free cookbook.

In addition to working with individuals and families, Holstein also assists schools that have >50% of their students qualifying for free/reduced lunches. Holstein has been pairing up with Head Start and many local elementary schools.

She also has been working with WIC (Women, Infants and Children) in all three counties, teaches classes at Care Corps Homeless shelter and ACS Career Services. And she works with seniors (for example at senior centers) as long as 50% qualify. At this time she is serving two senior centers, one in Arlington and one in Blair.

You can learn more about the Nutrition Education Program at <http://nep.unl.edu>. Or you can contact Holstein at the UNL Extension office in Dodge County at 402-727-2775. □



Casey Holstein, RD serves Dodge, Saunders, and Washington Counties



M.E.A.D

Making Education in Agriculture Different

Plant Science Students Visit ARDC

by Adam Taylor, Plant and Soil Science student

Plant and Soil Science students have begun making regular visits to the ARDC Turf Grass Research Division. During

the visits Lannie Witt, Turf Grass Operations Manager, has been teaching the students practical applications a home-owner can

use to care for their lawn. They have also been learning about the many research projects that are going on at the ARDC.



During their visit to the ARDC, the students learned how the PGA measures ball speed.

"I think its really awesome what they're doing out here," Levi Koemel says about the trips to the ARDC. During the students first visit they learned about the effects of pedestrian traffic on ball speed. The students saw that people walking on the greens dramatically affected ball speed. This was one of the many research projects going on sponsored by the PGA. During the last visit the students learned how to calibrate seed spreaders. "This is something I will definitely use when I own my own home," Adam Taylor said about the technique he learned. While they have only made a few trips to the ARDC more are planned in the near future to touch on other plant science topics. □

Crop Management in the Summer and in the Winter

Evaluations from this year's *Crop Management Diagnostic Clinics* have been tabulated and plans are moving ahead full speed

for the *Crop Management Winter Programs*. There is a need for crop management education year-round and UNL Extension seeks to meet that need.

Conservatively, the summer clinics impacted **39% of Nebraska's row crop acres**, as those attending managed **5,392,527 acres**. They estimated the value of the knowledge gained and/or anticipated practice changes on a per acre basis at **\$5.74 per acre** - which brings the estimated total value of the program to **\$30,957,690!**

So how can other agribusiness professionals and producers get in on those type changes? The *Crop Management Winter Programs* are just around the corner. You can learn more about these course offerings, as well as CEU and College Credit Courses offered by UNL's Department of Agronomy and Horticulture at <http://ardc.unl.edu/training.htm>. □



Ag Awareness Festival Adds New Info

This year's Ag Awareness Festival followed tradition of educating 4th graders (approximately 750 of them) about agriculture. While at the festival Connie Reimers-Hild, UNL Extension Educator, provided information on the Agro-Environmental Trail (left). Students also experimented with hand-held GPS units (bottom) at the Farming Technology session. □

